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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/667,964	09/21/2000	John Charles Dalrymple	8371-104	8324

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EXAMINER	
THOMPSON, JAMES A	

ART UNIT	PAPER NUMBER
2624	

DATE MAILED: 09/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/667,964	DALRYMPLE, JOHN CHARLES	
	Examiner	Art Unit	
	James A. Thompson	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 September 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 23 June 2005 have been fully considered but they are not persuasive. All of the previous claims have been cancelled, therefore all of the prior claim rejections are withdrawn. While Examiner agrees with Applicant that the present claims are not fully taught by the prior art that has thus far been used in the prior art rejections of the previous office actions, additional prior art has been discovered which renders the present claims obvious to one of ordinary skill in the art at the time of the invention. The prior art rejections of the newly added claims are given below.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mintzer (US Patent 5,210,602) in view of Arce (US Patent 6,493,112 B1).

Regarding claim 16: Mintzer discloses generating a set of seed values from a random number generator (column 7, lines 30-36 of Mintzer); controlling the selection of the seed values from the random number generator (column 7, lines 36-41 of

Mintzer); and populating the error buffer with the set of selected seed values (figure 3(constant store) and column 7, lines 36-41 of Mintzer).

Mintzer does not disclose expressly that said seed values are controlled such that the seed values are relatively large, likely to cause a dot to be printed, producing a set of selected seed values.

Arce discloses controlling random seed values such that the seed values are relatively large, likely to cause a dot to be printed, producing a set of selected seed values (figure 4(Step 1) and column 11, lines 44-48 of Arce). The white noise values are set based on the desired number of printed dots in a pixel array (figure 4(Step 1) and column 11, lines 44-48 of Arce).

Mintzer and Arce are combinable because they are from the same field of endeavor, namely using random noise generators to mitigate the effects of halftone image processing artifacts in digital image processing systems. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to bias the seed values taught by Mintzer such that the seed values are likely to cause a dot to be printed, as taught by Arce. The motivation for doing so would have been to be able to generate a specific desired gray level (column 11, lines 39-43 of Arce). Therefore, it would have been obvious to combine Arce with Mintzer to obtain the invention as specified in claim 16.

Regarding claim 17: Mintzer discloses generating a set of seed values being performed at initialization of the digital image reproduction (column 7, lines 34-41 of Mintzer). Without the appropriate data in the coefficient store, which is produced using the seed values (column 7, lines 34-41 of Mintzer), error diffusion cannot occur. Therefore, the generation of the set of

seed values must occur at initialization of the digital image reproduction.

4. Claims 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mintzer (US Patent 5,210,602) in view of Klassen (US Patent 6,483,606 B1).

Regarding claim 18: Mintzer discloses generating a first set of seed values (figure 2a($c^{c1}_{r,s}$); figure 3(random number generator); and column 7, lines 32-42 of Mintzer); generating a second set of seed values (figure 2b($c^{c2}_{r,s}$); figure 3(random number generator); and column 7, lines 32-42 of Mintzer); generating a third set of seed values (figure 2c($c^{c3}_{r,s}$); figure 3(random number generator); and column 7, lines 32-42 of Mintzer); and populating three error buffers with the sets of seed values (figure 3(constant store) and column 7, lines 36-41 of Mintzer).

Mintzer does not disclose expressly that said second set of seed values negatively correlate with the first set of seed values.

Klassen discloses negatively correlating black and the other colors (figure 3(112) and column 6, line 61 to column 7, line 2 of Klassen) before the application of error diffusion (figure 3(120) and column 7, lines 26-29 of Klassen). Under-color removal provides a negative correlation between black and the other colors (column 6, line 61 to column 7, line 2 of Klassen). Based on this negative correlation, scalar error diffusion is then performed on black (column 7, lines 26-29 of Klassen) and vector error diffusion is performed on the remaining colors (column 7, lines 29-33 of Klassen).

Mintzer and Klassen are combinable because they are from the same field of endeavor, namely color halftone processing and error diffusion of color digital image data. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the negative correlation between black and the other colors during halftone processing, as taught by Klassen, particularly during the generation of the first and second seed value set taught by Mintzer. The suggestion for doing so would have been that black is negatively correlated with the other colors in cmyk halftone printing (column 6, line 61 to column 7, line 2 of Klassen). Therefore, it would have been obvious to combine Klassen with Mintzer to obtain the invention as specified in claim 18.

Regarding claim 19: Mintzer discloses generating a set of seed values from a first constant (column 7, lines 33-37 of Mintzer). The random error diffusion constants used are based on a set of fixed error diffusion constants since a random number is multiplied by said fixed error diffusion constants (column 7, lines 33-37 of Mintzer). Further, as is well-known in the art, the values available for use in error diffusion are based on well established criteria, such as numerical stability. Thus, even though the error diffusion constants are based on randomly generated numbers, the error diffusion constants are also based on fixed values, namely the original fixed error diffusion constants which are determined using specific criteria.

Regarding claim 20: Mintzer discloses generating a second set of seed values from a second constant (figure 2b($c_{r,s}^{c2}$); figure 3(random number generator); and column 7, lines 32-42 of Mintzer).

Mintzer does not disclose expressly altering the second set of seed values to negatively correlate to the first set.

Klassen discloses altering the black color map to negatively correlate black with the other colors (figure 3 (112) and column 6, line 61 to column 7, line 2 of Klassen) before the application of error diffusion (figure 3(120) and column 7, lines 26-29 of Klassen).

Mintzer and Klassen are combinable because they are from the same field of endeavor, namely color halftone processing and error diffusion of color digital image data. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to alter the black color map to produce a negative correlation between black and the other colors during halftone processing, as taught by Klassen, thus altering the second seed value set taught by Mintzer so that the second seed value set negatively correlates with the first color set. The suggestion for doing so would have been that black is negatively correlated with the other colors in cmyk halftone printing (column 6, line 61 to column 7, line 2 of Klassen). Therefore, it would have been obvious to combine Klassen with Mintzer to obtain the invention as specified in claim 20.

Regarding claim 21: Mintzer discloses generating a third set of seed values from a third constant (figure 2c($c_{r,s}^{c3}$) of Mintzer) different from the first and second constants (figure 3 (random number generator); and column 7, lines 32-42 of Mintzer).

Regarding claim 22: Mintzer does not disclose expressly performing a negative correlation from the first set of seed values to form the second set of seed values.

Klassen discloses altering the black color map to negatively correlate black with the other colors (figure 3 (112) and column 6, line 61 to column 7, line 2 of Klassen).

Mintzer and Klassen are combinable because they are from the same field of endeavor, namely color halftone processing and error diffusion of color digital image data. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to alter the black color map to perform negative correlation between black and the other colors during halftone processing, as taught by Klassen, thus altering the second seed value set taught by Mintzer so that the second seed value set negatively correlates with the first color set. The suggestion for doing so would have been that black is negatively correlated with the other colors in cmyk halftone printing (column 6, line 61 to column 7, line 2 of Klassen). Therefore, it would have been obvious to combine Klassen with Mintzer to obtain the invention as specified in claim 22.

Regarding claim 23: Mintzer does not disclose expressly multiplying said first set of seed values by a negative number to form the second set of seed values.

Klassen discloses multiplying the amount by which the colors other than black are modified by a negative number to provide the amount by which black is modified (column 6, line 61 to column 7, line 1 of Klassen).

Mintzer and Klassen are combinable because they are from the same field of endeavor, namely color halftone processing and error diffusion of color digital image data. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the negative amount of color value alteration used by the colors other than black to modify the

amount of color used for black, as taught by Klassen, thus altering the second seed value set taught by Mintzer so that the second seed value is the negative number of the first seed value. The suggestion for doing so would have been that black is negatively correlated with the other colors in cmyk halftone printing (column 6, line 61 to column 7, line 2 of Klassen). Therefore, it would have been obvious to combine Klassen with Mintzer to obtain the invention as specified in claim 23.

5. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mintzer (US Patent 5,210,602) in view of Klassen (US Patent 6,483,606 B1) and obvious engineering design choice.

Regarding claim 24: Mintzer discloses generating two random numbers from a random number generator (column 7, lines 33-37 of Mintzer); and applying a first function to the two random numbers to generate a first set of seed values (figure 2a ($c_{r,s}^{c1}$) and column 7, lines 32-42 of Mintzer); generating a second set of seed values (figure 2b($c_{r,s}^{c2}$); figure 3(random number generator); and column 7, lines 32-42 of Mintzer); and generating a third set of seed values (figure 2c($c_{r,s}^{c3}$); figure 3(random number generator); and column 7, lines 32-42 of Mintzer).

Mintzer does not disclose expressly that said second set of seed values is generated by applying a second function that is 120 degrees out of phase from the first function to the two random numbers; and that said third set of seed values is generated by applying a third function that is 120 degrees out of phase from the first and second functions.

Klassen discloses multiplying the amount by which the colors other than black are modified by a negative number to provide the amount by which black is modified (column 6, line 61 to column 7, line 1 of Klassen).

Mintzer and Klassen are combinable because they are from the same field of endeavor, namely color halftone processing and error diffusion of color digital image data. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a negative amount of the function used for modifying colors other than black for the function that modifies the other colors, as taught by Klassen, thus altering the second seed value set taught by Mintzer so that the second seed value is the negative number of the first seed value. The suggestion for doing so would have been that black is negatively correlated with the other colors in cmyk halftone printing (column 6, line 61 to column 7, line 2 of Klassen). Therefore, it would have been obvious to combine Klassen with Mintzer.

Mintzer in view of Klassen does not disclose expressly that the second function is 120 degrees out of phase from the first function and the third function is 120 degrees out of phase with the first and second function. However, given the three sets of seed values taught by Mintzer, it would have been an obvious engineering design choice to use a second function that is 120 degrees out of phase from the first function and a third function that is 120 degrees out of phase with the first and second functions. When the first set of seed values and the second set of seed values are simply negatively correlated with each other, the second set of seed values are the negative of the first set of seed values, such as discussed in the arguments regarding claim 23. In Klassen, in order to obtain the proper

colors for an image, the differences must balance out, thus the addition to the black color makes up for the subtraction of the other colors (column 6, line 61 to column 7, line 1 of Klassen). Furthermore, as is well-known in the art, in order to maintain numerical stability in error diffusion computations (or any other type of finite-difference based computational algorithm), the error diffusion coefficients must balance out to zero. Thus, the three functions used for the three corresponding sets of seed values must also balance out to zero. In the case of two sets of seed values, a function and its negative are used, as demonstrated in the arguments regarding claim 23 above. Another way in which a function and its negative can be expressed is in phasor notation, which would be written as the first function and a function that is 180 degrees out of phase with said first function, or: $f_1 + f_2 = f_1 - f_1 = 1\angle 0° f_1 + 1\angle 180° f_1 = 0$, where f_1 is said first function and f_2 is said second function. For the case of three sets of seed values, balancing the functions out to zero would be performed with the equation: $f_1 + f_2 + f_3 = 1\angle 0° f_1 + 1\angle 120° f_1 + 1\angle -120° f_1 = 0$, where f_1 is said first function, f_2 is said second function, and f_3 is said third function. This type of phasor manipulation is a basic mathematical function and would have been obvious to one of ordinary skill in the art at the time of the invention when faced with the three sets of seed values taught by Mintzer. The motivation to use said manipulation would be, as stated above, to balance out the three function to zero, thus ensuring the numerical stability of the error diffusion computations.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lau et al., US Patent 6,798,537 B1, patented 28 September 2004, filed 24 January 2000, provisional application filed 27 January 1999.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is 571-272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James A. Thompson
Examiner
Art Unit 2624

JAT
29 August 2005

THOMAS D. LEE
PRIMARY EXAMINER